MFM2P

Standard form

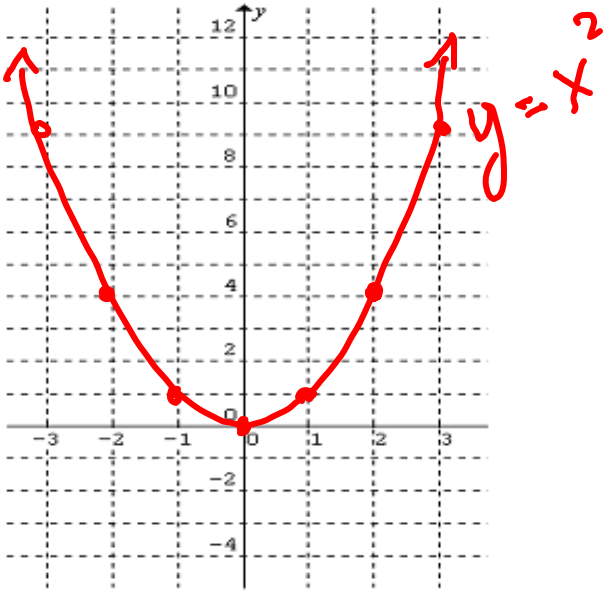
factored form

Lesson 4.2: Characteristics of Quadratic Relations

A quadratic relation is always in the form $y = ax^2 + bx + c$ & $y = a(x-s)(x-t)$.

The simplest quadratic is $y = x^2$. Every single other quadratic is just some transformation of this one. So what does $y = x^2$ look like? Graph it!

x	$y = x^2$
-3	9
-2	4
-1	1
0	0
1	1
2	4
3	9
4	16



How is $y = mx + b$ different from $y = ax^2 + bx + c$ & $y = a(x+r)(x+s)$?

$y = mx + b$

- linear
- straight line
- exponent is 1
- m slope
- b y-intercept

$y = ax^2 + bx + c$ & $y = a(x+r)(x+s)$

a = ?

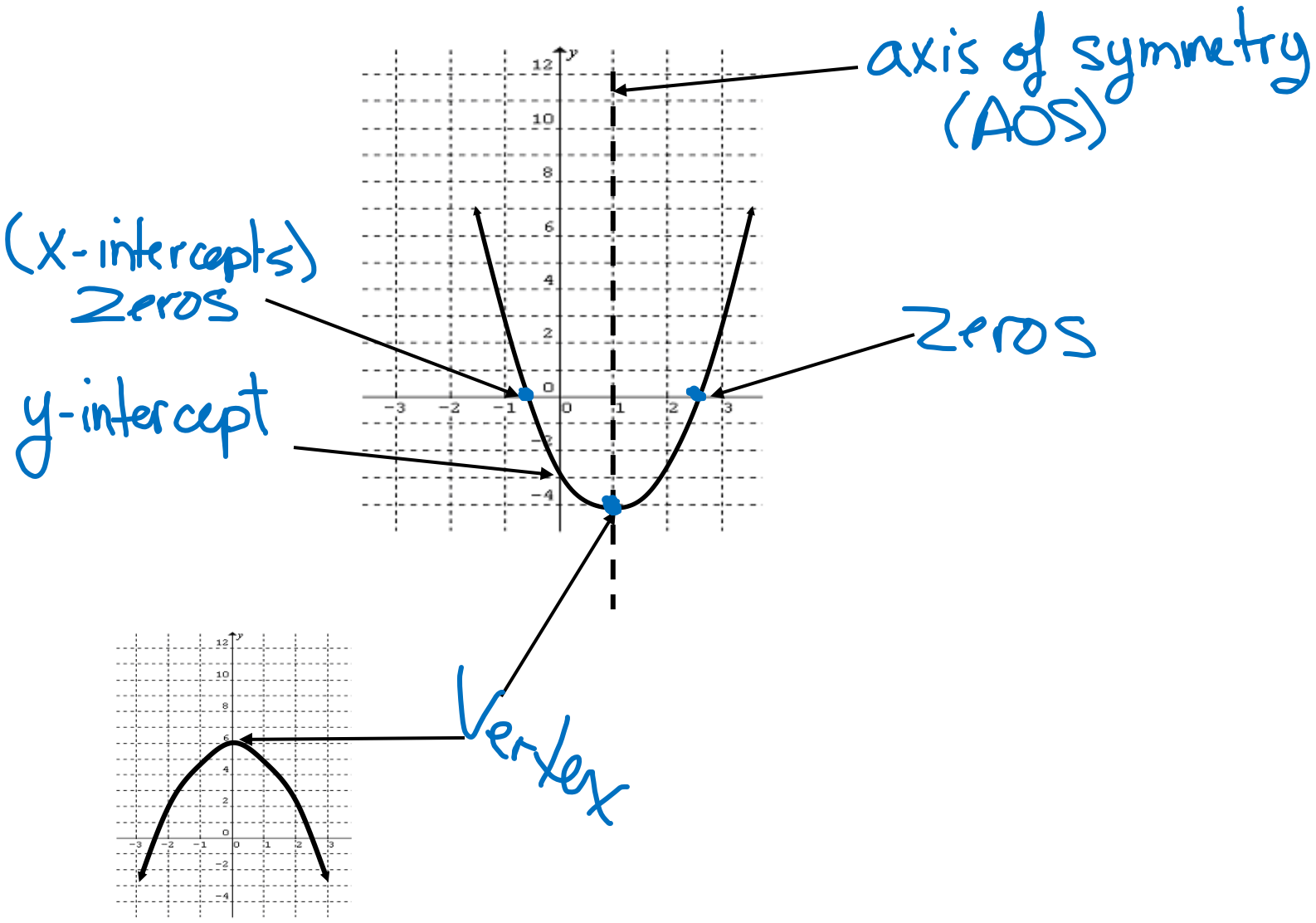
a = sign

c = y-intercept

r & s are the zeroes OR x-intercepts

The graph of a quadratic is called a parabola.

Anatomy of a Parabola

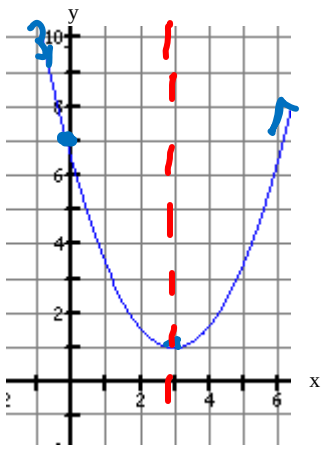
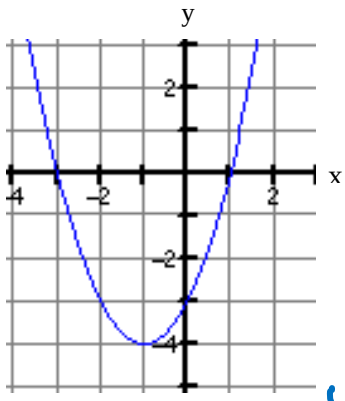
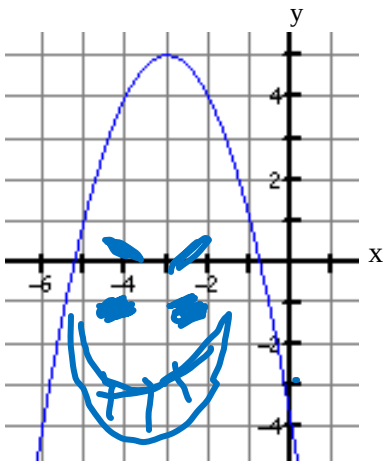


Everything you ever wanted to know about parabolas…

- Parabolas can open up or down
- The zeros of a parabola is where the graph crosses the x – axis
- "zeros" can also be called "x – intercepts" or "roots"
- The axis of symmetry divides the parabola into two equal halves
- The Vertex of a parabola is the point where the axis of symmetry and the parabola meet. It is the point where the parabola is at its maximum or minimum value.
- The y-intercept where the graph crosses the y axis.

Introducing… The Parabola! (Continued)

For the following parabolas, fill in the table which follows.

Parabola Graph			
Vertex	(3,1)	(-1,-4)	(-3,5)
Minimum or Maximum Value	min	Minimum	max. val
Axis of Symmetry	x = 3	x = -1	x = -3
Zeroes	none	(-3,0) & (1,0)	-1 and -5
Direction of Opening	up	up	down
Y – intercept	7	-8	-4

True or False… (use the above for answers)

False — The axis of symmetry goes through the y – intercept.

True — The vertex is always located halfway between the zeroes.

True — The x – coordinate of the vertex is always the same as the axis of symmetry.

False — A parabola must open up.

False — The y – intercept is always positive.

Hmwk: P. 260 #1, 4 & 6